AI Planning
Exercise Sheet 3

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Exercise 3.1

See hand written notes.

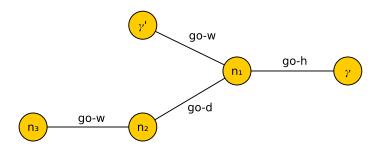## Exercise 3.2

(d=dancing, h=at-home, w=work, ro=romeo, ju=juliet)
We start at: $\gamma = ju\text{--}d \wedge ro\text{--}h$
We want to reach: $I = \{ro\text{--}h \mapsto 1, ju\text{--}h \mapsto 1\}$
Operators: $go\text{--}d$, $go\text{--}w$, $go\text{--}h$

$regr_{go\text{--}w}(\gamma) = ro\text{--}h \wedge$
$\quad ((EPC_{ju\text{--}d}(e_{go\text{--}w}) \vee (ju\text{--}d \wedge \neg EPC_{\neg ju\text{--}d}(e_{go\text{--}w}))) \wedge$
$\quad\quad (EPC_{ro\text{--}h}(e_{go\text{--}w}) \vee (ro\text{--}h \wedge \neg EPC_{\neg ro\text{--}h}(e_{go\text{--}w})))$
$\quad) \wedge \kappa$
$regr_{go\text{--}w}(\gamma) = ro\text{--}h \wedge$
$\quad ((\bot \vee (ju\text{--}d \wedge \top)) \wedge$
$\quad\quad (\bot \vee (ro\text{--}h \wedge \bot))$
$\quad) \wedge \kappa$
$regr_{go\text{--}w}(\gamma) = \bot$
$\Rightarrow \gamma$ is not reachable by means of $go\text{--}w$

$regr_{go\text{--}h}(\gamma) = ro\text{--}w \wedge$
$\quad ((\bot \vee (ju\text{--}d \wedge \top)) \wedge$
$\quad\quad (EPC_{ro\text{--}h}(e_{go\text{--}h}) \vee (ro\text{--}h \wedge \neg EPC_{\neg ro\text{--}h}(e_{go\text{--}h})))$
$\quad) \wedge \kappa$
$regr_{go\text{--}h}(\gamma) = ro\text{--}w \wedge$
$\quad ((\bot \vee (ju\text{--}d \wedge \top)) \wedge$
$\quad\quad \top$
$\quad) \wedge \kappa$
$regr_{go\text{--}h}(\gamma) = ro\text{--}w \wedge ju\text{--}d$
$\Rightarrow \gamma$ is reachable from $ro\text{--}w \wedge ju\text{--}d$ by means of $go\text{--}h$

//Note: less verbose from this point onwards.

$regr_{go\text{--}d}(\gamma) = ju\text{--}h \wedge \top \wedge (\bot \vee (ro\text{--}h \wedge \neg ro\text{--}h)) \wedge \kappa = \bot$
$\Rightarrow \gamma$ is not reachable by means of $go\text{--}d$

$\Rightarrow$ the only node to expand from is $n_1 = ro\text{--}w \wedge ju\text{--}d$

$regr_{go\text{--}w}(n_1) = ro\text{--}h \wedge ju\text{--}d$ (similar to γ, no further expansion)
$regr_{go\text{--}h}(n_1) = \bot$
$regr_{go\text{--}d}(n_1) = ro\text{--}w \wedge ju\text{--}h$ $(= n_2)$

$regr_{go\text{--}w}(n_2) = ro\text{--}h \wedge ju\text{--}h$ $(= n_3 \models I)$

Resulting search tree:

Resulting plan:
$go\text{--}w$, $go\text{--}d$, $go\text{--}h$